Univerza v Mariboru
University of Maribor

Fakulteta za naravoslovje in matematiko / Faculty of Natural Sciences and Mathematics

OPIS PREDMETA / SUBJECT SPECIFICATION	
Predmet:	**Fizikalna kemija 1**
Subject Title:	**Physical Chemistry 1**

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Izobraževalna kemija Educational Chemistry		3.	**zimski** **Autumn**

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. Vaje Lab. Work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
60					90	**5**

Nosilec predmeta / Lecturer: Aljana Petek

Jeziki / Languages:	
Predavanja / Lecture:	slovenski / Slovene
Vaje / Tutorial:	

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Osnovno znanje splošne in anorganske kemije, matematike in fizike	Basic knowledge of general and inorganic chemistry, mathematics and physics

Vsebina:	**Contents (Syllabus outline):**
• Plini in sile med molekulami: idealni plin, kinetična teorija plinov, interakcije med molekulami, van der Waalsov plin • Energija: prvi zakon termodinamike, spremembe notranje energije in entalpije v fizikalno-kemijskih procesih, termokemija • Entropija: drugi zakon termodinamike, entropija plinov in plinastih mešanic, entropijske spremembe v fizikalno-kemijskih procesih, tretji zakon termodinamike • Gibbsova prosta energija: posebna formulacija drugega zakona, spremembe proste energije v fizikalno-kemijskih procesih, kemijski potencial, ravnotežje v fizikalno-kemijskih sistemih • Ravnotežje čistih snovi: fazni diagram, termodinamika ravnotežnih črt, zamrzovanje, tlak tekočin in parni tlak • Binarne mešanice: fazno pravilo, idealne mešanice, idealne razredčene mešanice, koligativne lastnosti, topnost, realni plini, fugativnost, realne raztopine, aktivnost • Fazni diagrami: diagram parnih tlakov, vrelni diagrami, ravnotežje tekoče-tekoče, ravnotežje trdno-tekoče • Kemijsko ravnotežje: homogeno kemijsko ravnotežje, heterogeno ravnotežje	• Gasses and intermolecular forces : the ideal gas, kinetic theory of gases, intermolecular interactions, the van der Waals gas • Energy: the first law of thermodynamics, changes of internal energy and enthalpy in physicochemical processes, thermochemistry • Entropy: the second law of thermodynamics, entropy of gasses and gas mixtures, entropy changes in physicochemical processes, the third law of thermodynamics • Gibbs free energy: specific formulations of the second law, free energy changes in physicochemical processes, the chemical potential, equilibrium in in physicochemical systems • Equlibrium in pure substances: the phase diagram, thermodynamics of equilibrium lines, refrigeration, liquid pressure and vapour pressure • Binary mixtures: the phase rule, ideal mixtures, ideally diluted mixtures, colligative properties, solubility, real gases, fugacity, real liquid mixtures, activity • Phase diagrams:vapour pressure diagrams, temperature-composition diagrams, liquid-liquid phase diagrams, liquid-solid phase diagrams

	• Chemical equlibrium: homogeneous chemical equlibrium, heterogeneous equilibrium

Temeljni študijski viri / Textbooks:

- P. W. Atkins, J. de Paula: *Physical Chemistry, 8th Ed*., Oxford University Press, 2006.
- P. W. Atkins, J. de Paula: *Physical Chemistry, 7th Ed*., Oxford University Press, 2002.
- P. W. Atkins: *Physical Chemistry, 6th Ed*., Oxford University Press, 1998.
- Aljana Petek: *Zapiski predavanj* – interno študijsko gradivo (Course notes), 2007.

Cilji:	**Objectives:**
• Razumeti fizikalni pomen fizikalno-kemijskih zakonov in formul ter povezave med njimi in to znati uporabiti pri plinih, tekočinah, trdnih snoveh in raztopinah.	• Have more insight in the physical meaning of the physicochemical principles and formulas and the links between them and applied these to gases, liquids, solids, and solutions.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Po zaključku tega predmeta bo študent sposoben: • razumeti pojme in zakone kemijske termodinamike in njihove uporabe v fizikalnem in kemijskem ravnotežju; • razumeti osnovne pojme v termodinamiki raztopin elektrolitov in ravnotežni elektrokemiji. Prenesljive/ključne spretnosti in drugi atributi: • Študenti bodo razvili spretnost pisnega komuniciranja, reševanja problemov, računanja, kot tudi sposobnost samostojnega študija.	Knowledge and Understanding: On completion of this course the student will be able to: • understand the concepts, laws and ways of thinking of chemical thermodynamics and its applications to physical and chemical equilibrium; • have insight into fundamental concepts of thermodynamics of electrolyte solutions and equilibrium electrochemistry. Transferable/Key Skills and other attributes: • Students will develop written communication skills, problem solving, computational skills, as will the ability to study independently.

Metode poučevanja in učenja:	**Learning and teaching methods:**
• Predavanja • Reševanje problemov • Domače naloge	• Classroom lectures • Classroom problem solving sessions, • Homework assigments.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**

• Pisni izpit, • Ustni izpit.	50 50	• Written examination, • Oral examination.

Materialni pogoji za izvedbo predmeta :	***Material conditions for subject realization***
• predavalnica s potrebno opremo in multimedijskimi pripomočki,	• lecture room with necessary equipment and multimedia facilities,

Obveznosti študentov:	***Students' commitments:***
(pisni, ustni izpit, naloge, projekti)	*(written, oral examination, coursework, projects):*
• pisni izpit, • ustni izpit	• written examination, • oral examination.